

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

To:

see form PCT/ISA/220

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/FI2004/000440

International filing date (day/month/year)  
08.07.2004

Priority date (day/month/year)  
08.07.2003

International Patent Classification (IPC) or both national classification and IPC  
H01L21/312, C23C16/40

Applicant  
SILECS OY

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl  
Fax: +31 70 340 - 3016

Authorized Officer

Telephone No. +31 70 340-



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/FI2004/000440

---

**Box No. I Basis of the opinion**

---

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**Re Item V.**

Reference is made to the following documents:

- D1 : US 2002/004298 A1 (SUGAHARA GAKU ET AL) 10 January 2002 (2002-01-10)  
D2 : EP 0 713 927 A (AIR PRODUCTS AND CHEMICALS, INC) 29 May 1996 (1996-05-29)  
D3 : US 2002/076944 A1 (WANG QING MIN ET AL) 20 June 2002 (2002-06-20)

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Novelty:

- 1 In so far as the "optional" group  $R^2$  is not present, the subject-matter of claim 1 lacks novelty with respect to document D1, which discloses a method for forming a low dielectric constant silicone layer on a semiconductor substrate by means of a polymerisation of a silicon containing compound (see paragraphs [0071] to [0095]). The silicon compounds employed include vinyltrimethoxysilane and divinyltrimethoxysilane, both of which correspond to the formula in claim 1 when  $R^2$  is absent,  $R^1$  is vinyl and  $X^1$  is methoxy. The subject-matter of claim 1 and furthermore that of dependent claims 2, 5, 7 and 15 is thus known from D1.
- 2 Document D2 also discloses a method for forming a low dielectric constant silicone layer by polymerisation of a silicon containing compound (see col.1, lines 5-11). The silicon precursors which are used include (see col.3, line 12 to col.4, line 30) various compounds which match the formula in claim 1 in the case that group  $R^2$  is absent. Specific examples are diethylfluorosilane and diethyldifluorosilane. It appears from dependent claims 3, 7 and 8 that partially or fully fluorinated alkyl groups fall under the heading or "hydrocarbyl". The subject-matter of claims 1-3, 5, 6, 8 and 9 is known from this document.

- 3 Document D3 shows a method as claimed in claim 1 (see paragraph [0018]; claims 1-7,11 and 12) which, according to specific examples, uses silicon containing compounds in which  $R^2$  is missing,  $R^1$  is cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl or cyclooctyl and  $X^1$  is hydrogen. The subject-matter of claims 1,2,4,5 and 15 is known from D3.
- 4 The subject-matter of claims 10-14 and 16-66 is not known from the prior art is therefore novel in the sense of Article 33(2) PCT.

Inventive step:

- 5 Since the subject-matter of claims 1-9 and 15 is not new, it cannot involve an inventive step either.
- 6 It must be pointed out that the claims as a whole lack clarity (Article 6 PCT), particularly because there is disagreement between independent claim 1, on the one hand, and independent claims 17,35,51,62 and 63, on the other hand, as to whether the 4-substituted aromatic group  $R^2$  is necessarily a feature of the invention. Notwithstanding this reservation, the subject-matter of independent claims 17,35,51,62 and 63 does not appear to be suggested by the prior art as represented by any of the documents D1-D3. Even though it is known (cf. document D4) to form layers of silane materials including the aromatic group  $R^2$  by vapour deposition methods, there is no hint at their use in the formation of polymerised, low dielectric constant structures. Therefore both this subject-matter and that of the dependent claims 10-14,16,18-34,36-50,52-61 and 64-66 involves an inventive step in the sense of Article 33(2) PCT.

**Re Item VI**

**Certain documents cited**

Certain published documents

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
WO2004/027110 A	01/04/2004	18/09/2003	18/09/2002

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)**

---

International application No.

PCT/FI2004/000440

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/FI2004/000440

---

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

1. Statement

Novelty (N)	Yes: Claims	10-14,16-66
	No: Claims	1-9,15
Inventive step (IS)	Yes: Claims	10-14,16-66
	No: Claims	1-9,15
Industrial applicability (IA)	Yes: Claims	1-66
	No: Claims	

2. Citations and explanations

**see separate sheet**

---

**Box No. VI Certain documents cited**

---

1. Certain published documents (Rules 43bis.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43bis.1 and 70.9)

**see form 210**